

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-14. (Cancelled)

15. (Currently Amended) A method, implemented at least in part by a computing device, for rendering an object having light reflective properties, the method comprising:

determining a destination viewing vector for rendering the object from a destination viewpoint;

determining a set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different, specific viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object and comprising texels that each represent a pre-integrated value of total reflected radiance;

warping, on a per-texel basis, each source radiance environment map of the set of source radiance environment maps based on the destination viewing vector and the source viewing vector associated with the source radiance environment map; ~~and~~

blending the warped source radiance environment maps to create a destination radiance environment map, and

render the object.

16. (Previously Presented) The method as recited in claim 15, wherein the object can be rendered in a reflection space with texture mapped from the destination radiance environment map.

17. (Previously Presented) The method as recited in claim 15, wherein the object can be rendered without performing an integration during rendering.

18. (Previously Presented) The method as recited in claim 15, further comprising providing the destination radiance environment map to a graphic hardware system to render the object with texture environment mapping of the destination radiance environment map.

19. (Previously Presented) The method as recited in claim 18, further comprising rendering the object with texture environment mapping of the destination radiance environment map.
20. (Previously Presented) The method as recited in claim 15, wherein warping each source radiance environment map comprises mirror reflection warping each source radiance environment map.
21. (Previously Presented) The method as recited in claim 15, wherein warping each source radiance environment map comprises surface normal reflection warping each source radiance environment map.
22. (Previously Presented) The method as recited in claim 15, further comprising pre-integrating a bidirectional reflection distribution function with a lighting environment to create the set of source radiance environment maps.
23. (Previously Presented) The method as recited in claim 22, wherein warping each source radiance environment map comprises warping each source radiance environment map with a warping function that models the bidirectional reflection distribution function.
24. (Previously Presented) The method as recited in claim 15, wherein warping each source radiance environment map comprises generating meshes with warped sets of texture coordinates, each mesh having a respective set of warped texture coordinates corresponding to a respective warped source radiance environment map.
25. (Previously Presented) The method as recited in claim 15, wherein blending the warped source radiance environment maps comprises blending the warped source radiance environment maps at a respective weight, and accumulating the blended warped source radiance environment maps in a buffer to create the destination radiance environment map.

26. (Previously Presented) The method as recited in claim 25, further comprising computing a set of weights for the set of source radiance environment maps.

27. (Previously Presented) The method as recited in claim 26, further comprising normalizing the set of weights.

28. (Previously Presented) The method as recited in claim 27, further comprising normalizing the destination radiance environment map based on the normalized set of weights.

29. (Previously Presented) The method as recited in claim 28, further comprising:
loading the normalized destination environment map image into a texture memory;
and

rendering the object, wherein said rendering step includes texture environment mapping the normalized destination environment map onto the object.

30. (Previously Presented) The method as recited in claim 15, further comprising:
loading a global set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object;

determining a subset of source viewing vectors which are nearest to the destination viewing vector; and

wherein warping each source radiance environment map comprises warping each source radiance environment map associated with the subset of source viewing vectors.

31. (Previously Presented) The method as recited in claim 15, further comprising loading a sphere geometry for each source radiance environment map.

32. (Currently Amended) A computer-readable medium having computer-readable instructions, implemented at least in part by a computing device, for rendering an object

having light reflective properties, the computer-readable instructions when executed on a processor performing:

determining a destination viewing vector for rendering the object from a destination viewpoint;

determining a set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different, specific viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object and comprising texels that each represent a pre-integrated value of total reflected radiance;

warping, on a per-texel basis, each source radiance environment map of the set of source radiance environment maps based on the destination viewing vector and the source viewing vector associated with the source radiance environment map; ~~and~~

blending the warped source radiance environment maps to create a destination radiance environment map; and

rendering the object.

33. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the object can be rendered in a reflection space with texture mapped from the destination radiance environment map.

34. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the object can be rendered without performing an integration during rendering.

35. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the instructions further cause the processor to perform providing the destination radiance environment map to a graphic hardware system to render the object with texture environment mapping of the destination radiance environment map.

36. (Previously Presented) The computer-readable medium as recited in claim 35, wherein the instructions further cause the processor to perform rendering the object with texture environment mapping of the destination radiance environment map.

37. (Previously Presented) The computer-readable medium as recited in claim 32, wherein warping each source radiance environment map comprises mirror reflection warping each source radiance environment map.

38. (Previously Presented) The computer-readable medium as recited in claim 32, wherein warping each source radiance environment map comprises surface normal reflection warping each source radiance environment map.

39. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the instructions further cause the processor to perform pre-integrating a bidirectional reflection distribution function with a lighting environment to create the set of source radiance environment maps.

40. (Previously Presented) The computer-readable medium as recited in claim 39, wherein warping each source radiance environment map comprises warping each source radiance environment map with a warping function that models the bidirectional reflection distribution function.

41. (Previously Presented) The computer-readable medium as recited in claim 32, wherein warping each source radiance environment map comprises generating meshes with warped sets of texture coordinates, each mesh having a respective set of warped texture coordinates corresponding to a respective warped source radiance environment map.

42. (Previously Presented) The computer-readable medium as recited in claim 32, wherein blending the warped source radiance environment maps comprises blending the warped source radiance environment maps at a respective weight, and accumulating the blended warped source radiance environment maps in a buffer to create the destination radiance environment map.

43. (Previously Presented) The computer-readable medium as recited in claim 42, wherein the instructions further cause the processor to perform computing a set of weights for the set of source radiance environment maps.

44. (Previously Presented) The computer-readable medium as recited in claim 43, wherein the instructions further cause the processor to perform normalizing the set of weights.

45. (Previously Presented) The computer-readable medium as recited in claim 44, wherein the instructions further cause the processor to perform normalizing the destination radiance environment map based on the normalized set of weights.

46. (Previously Presented) The computer-readable medium as recited in claim 45, wherein the instructions further cause the processor to perform:
loading the normalized destination environment map image into a texture memory;
and
rendering the object, wherein said rendering step includes texture environment mapping the normalized destination environment map onto the object.

47. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the instructions further cause the processor to perform:
loading a global set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object;
determining a subset of source viewing vectors which are nearest to the destination viewing vector; and
wherein warping each source radiance environment map comprises warping each source radiance environment map associated with the subset of source viewing vectors.

48. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the instructions further cause the processor to perform loading a sphere geometry for each source radiance environment map.

49. (Currently Amended) A system for rendering an object having lighting reflections, comprising:

a processor that is configured to perform:

determining a destination viewing vector for rendering the object from a destination viewpoint;

determining a set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different, specific viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object and comprising texels that each represent a pre-integrated value of total reflected radiance;

warping, on a per-texel basis, each source radiance environment map of the set of source radiance environment maps based on the destination viewing vector and the source viewing vector associated with the source radiance environment map; ~~and~~

blending the warped source radiance environment maps to create a destination radiance environment map; and

rendering the object.

50. (Previously Presented) The system as recited in claim 49, wherein the object can be rendered in a reflection space with texture mapped from the destination radiance environment map.

51. (Previously Presented) The system as recited in claim 49, wherein the object can be rendered without performing an integration during rendering.

52. (Previously Presented) The system as recited in claim 49, wherein the processor is further configured to perform providing the destination radiance environment map to a

graphic hardware system to render the object with texture environment mapping of the destination radiance environment map.

53. (Previously Presented) The system as recited in claim 52, wherein the processor is further configured to perform rendering the object with texture environment mapping of the destination radiance environment map.

54. (Previously Presented) The system as recited in claim 49, wherein warping each source radiance environment map comprises mirror reflection warping each source radiance environment map.

55. (Previously Presented) The system as recited in claim 49, wherein warping each source radiance environment map comprises surface normal reflection warping each source radiance environment map.

56. (Previously Presented) The system as recited in claim 49, wherein the processor is further configured to perform pre-integrating a bidirectional reflection distribution function with a lighting environment to create the set of source radiance environment maps.

57. (Previously Presented) The system as recited in claim 56, wherein warping each source radiance environment map comprises warping each source radiance environment map with a warping function that models the bidirectional reflection distribution function.

58. (Previously Presented) The system as recited in claim 49, wherein warping each source radiance environment map comprises generating meshes with warped sets of texture coordinates, each mesh having a respective set of warped texture coordinates corresponding to a respective warped source radiance environment map.

59. (Previously Presented) The system as recited in claim 49, wherein blending the warped source radiance environment maps comprises blending the warped source radiance

environment maps at a respective weight, and accumulating the blended warped source radiance environment maps in a buffer to create the destination radiance environment map.

60. (Previously Presented) The system as recited in claim 59, wherein the processor is further configured to perform computing a set of weights for the set of source radiance environment maps.

61. (Previously Presented) The system as recited in claim 60, wherein the processor is further configured to perform normalizing the set of weights.

62. (Previously Presented) The system as recited in claim 61, wherein the processor is further configured to perform normalizing the destination radiance environment map based on the normalized set of weights.

63. (Previously Presented) The system as recited in claim 62, wherein the processor is further configured to perform:

loading the normalized destination environment map image into a texture memory.

64. (Previously Presented) The system as recited in claim 49, wherein the processor is further configured to perform:

loading a global set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object;

determining a subset of source viewing vectors which are nearest to the destination viewing vector; and

wherein warping each source radiance environment map comprises warping each source radiance environment map associated with the subset of source viewing vectors.

65. (Previously Presented) The system as recited in claim 49, wherein the processor is further configured to perform loading a sphere geometry for each source radiance environment map.

66. (Previously Presented) The system as recited in claim 49, further comprising a graphic hardware system that receives the destination radiance environment map created by the processor and renders the object with texture environment mapping of the destination radiance environment map.

67. (Previously Presented) The system as recited in claim 66, wherein the graphic hardware system comprises:

- a geometry engine that receives the destination radiance environment map and performs geometric computations on the destination radiance environment map;

- a rasterizer that receives the computed destination radiance environment map and rasterizes the computed destination radiance environment map;

- a texture mapper; and

- an environment mapper, the texture mapper and environment mapper mapping texture and environment to the rasterized destination radiance environment map for rendering the object.

68. (Previously Presented) The method as recited in claim 15, wherein the texels that each represent the pre-integrated value of total reflected radiance represent total reflected radiance for one possible orientation of a hemisphere above the object.

69. (Previously Presented) The computer-readable medium as recited in claim 32, wherein the texels that each represent the pre-integrated value of total reflected radiance represent total reflected radiance for one possible orientation of a hemisphere above the object.

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70. (Previously Presented) The system as recited in claim 47, wherein the texels that each represent the pre-integrated value of total reflected radiance represent total reflected radiance for one possible orientation of a hemisphere above the object.